Health Consultation

DEVIL'S SWAMP LAKE

BATON ROUGE, EAST BATON ROUGE PARISH, LOUISIANA

CERCLIS NO. LAD985202464

APRIL 27, 2000

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
Atlanta, Georgia 30333

Health Consultation: A Note of Explanation

An ATSDR health consultation is a verbal or written response from ATSDR to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material. In order to prevent or mitigate exposures, a consultation may lead to specific actions, such as restricting use of or replacing water supplies; intensifying environmental sampling; restricting site access; or removing the contaminated material.

In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members. This concludes the health consultation process for this site, unless additional information is obtained by ATSDR which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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HEALTH CONSULTATION

DEVIL'S SWAMP LAKE

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CERCLIS NO. LAD985202464

Prepared by:

Louisiana Department of Health and Hospitals
Office of Public Health
Section of Environmental Epidemiology and Toxicology
Under Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry

Background and Statement of Issues

The United States Environmental Protection Agency (USEPA) recently completed the document A Human Health Risk Assessment, Devil's Swamp, Baton Rouge, Louisiana ,Volume 1 (HHRA) [1]. The Louisiana Office of Public Health (LOPH) was requested to evaluate the risk assessment and determine whether it is protective of public health. LOPH's evaluation focused on the nine-page summary of the HHRA.

Devil's Swamp is a cypress swamp,12 square miles in area, northwest of Baton Rouge, Louisiana, and adjacent to the Mississippi River (Attachment 1: Site Map). The Devil's Swamp site includes the following areas: North Bayou, Distributary Channels, North Swamp, Devil's Lake and South Swamp. It has been contaminated by hazardous-waste facilities that lie north and east of the swamp. These include Petro-Processors of Louisiana, Scenic and Brooklawn sites, and Laidlaw (formerly Rollins Environmental Services). Hazardous wastes from petrochemical industries were disposed of and stored in pits at these sites. Petro-Processors of Louisiana, Inc. ultimately was listed on the Superfund National Priorities List (NPL). Several other operating industrial facilities are in the vicinity as well [2].

As a result of Petro-Processors of Louisiana, Inc. being listed as an NPL site, LOPH completed a public health assessment for the site in January 1996 and a site review and update completed in September 1998 [3, 4]. Bayou Baton Rouge and Devil's Swamp were included because they are adjacent to but off site from the Petro-Processors site. It was concluded in the public health assessment that the combined sites, Petro-Processors of Louisiana, Inc., Bayou Baton Rouge, and Devil's Swamp, posed **a public health hazard.** The combined sites posed a risk of exposure to site-related contaminants in the past, present, and future through exposure from ingestion of fish, dermal contact, and incidental ingestion of contaminated soils and sediments, and inhalation of volatile compounds before and during remediation activities.

Since 1980, the USEPA, the Louisiana Department of Environmental Quality (LDEQ), and NPC Services (NPC) have collected water, sediment, and fish-tissue samples that have demonstrated the presence of organic compounds, including polychlorinated biphenyls (PCBs) in Devil's Swamp. Following the findings in 1985 and 1986 of PCBs in sediments from Devil's Swamp Lake, fish samples were collected and analyzed. PCBs were found below the Food and Drug Administration (FDA) action levels, but hexachlorobenzene (HCB) and hexachlorobutadiene (HCBD) were found at levels that warranted a fish-consumption advisory.

In October 1987, LOPH and LDEQ issued a fish-consumption advisory for Devil's Swamp Lake. The perimeter of the advisory was expanded through an advisory update to include Devil's Swamp and Bayou Baton Rouge in July 1993 (Attachments 2 and 3: Press Release and Fish-Consumption Advisory). The current advisory recommends that fish be consumed during no more than two meals per month and that no water-contact sports nor swimming occur in the areas of Devil's Swamp, Devil's Swamp Lake, and Bayou Baton Rouge.

The contaminants in the state's advisory update include HCB, HCBD, lead, mercury, and arsenic. Some crawfish samples have been subsequently collected, but as of this writing, crawfish and other shellfish have not been added to the advisory. The USEPA has collected additional samples since the state's advisory update [1]. LOPH has not evaluated these data.

Regardless of the current LOPH fish-consumption advisory, subsistence fishing has been reported and it is suspected that crawfish and fish are being sold to local fish markets from the Devil's Swamp Area. Various fishing areas in the swamp are accessible by boat or by foot. The community has expressed concerns about local residents' ingestion of fish from Devil's Swamp. As of this writing, no effort has been made to determine precisely who consumes fish, where fish are caught within the swamp, which species are consumed, how much is consumed, or how they are cooked/prepared (e.g., skin-on, skin-off). This site-specific information could be gathered through a needs assessment (modified Creel Survey) in which persons who are observed fishing are interviewed about their catches.

Discussion

Difference in Methodology

LOPH prepares fish-consumption advisories following the Memorandum of Understanding Protocol for Issuing Health Advisories and Bans based on Chemical Contamination of Fish/Shellfish in Louisiana (January 1997) [5]. This document outlines the roles of various state agencies and provides a flexible framework for making risk-assessment and management decisions. In 1987, when the fish-consumption advisory was first released, this document did not exist.

The LOPH advisory was planned so that it would be easy for the public to remember it, and therefore, providing a single set of consumption recommendations for Devil's Swamp Lake, Devil's Swamp, and Bayou Baton Rouge. The USEPA split the watershed into five subsections and evaluated each area individually. These subsections are the North Bayou, the Channels Area, the North Swamp, Devil's Lake and the South Swamp. Table 1 compares differences between the USEPA and LOPH data and exposure assumptions used to estimate exposure dose or to issue the fish-consumption advisory for Devil's Swamp.

Difference in Exposure Factors

LOPH assumes a fish-consumption frequency of one meal per week at the rate of one 8-ounce meal per week. This is equivalent to 30 grams per day (g/day). The USEPA Human Health Risk Assessment (HHRA) used a recreational fisher central-tendency (CT) value and a reasonable-maximum-exposure (RME) (upper 95% confidence interval) consumption rate based on studies conducted in Louisiana to estimate the rate of fish and shellfish ingestion. A subsistence-fisher rate was also used. USEPA's rates of ingestion for adult recreational and subsistence fisher are shown below.

Adult Recreational Scenario - Rates of ingestion

CT = 28.8 g/day fish and crawfish = (13.8 g catfish /day + 3 g bass/day + 12 g crawfish/day)

RME = 116.8 g/day fish and crawfish = (28.4 g catfish/day + 24.4 g bass/day + 64 g crawfish/day)

Subsistence fisher = 132 g/day

Table 1. Comparison of US Environmental Protection Agency (USEPA) and Louisiana Office of Public Health (LOPH) differences of exposure assumptions and data , Devil's Swamp, Baton Rouge, Louisiana (1999).

Methodology	USEPA	LOPH and LDEQ
Data used for evaluation	1992 USEPA sediment data 1996 NPC sediment data 1997 USEPA fish, crawfish, sediment, surface water data	1986 LDEQ[8] fish data 1992 USEPA fish data
Analytes [1]	HCB [2], HCBD [3], PCB [4], DDT[5], DDE [6†], DDD [7†], dieldrin, 1,2,4,5-tetrachlorobenzene, and pentachlorobenzene	HCB, HCBD, mercury, and arsenic‡
Exposure assumptions used to estimate dose		
Ingestion Rate	Arithmetic mean and reasonable maximum exposure	Ingestion at 30 grams per day [6]
Exposure Point Concentration	Arithmetic mean and reasonable maximum exposure (upper 95% confidence interval on arithmetic mean)	Arithmetic mean
Exposure scenarios	Adolescent and adult recreational, worker and subsistence exposure factors	Adult and child recreational

[1] Summed for total hazard index and total cancer risk; [2] HCB - hexachlorobenzene; [3] HCBD - hexachlorobutadiene; [4] PCBs - polychlorinated biphenyls; [5] DDT - 1,1,1-trichloro-2,2-bis(*p*-chlorophenyl)ethane; [6] DDE - 1,1-dichloro-2,2-bis(*p*-chlorophenyl)ethylene; [7] DDD - 1,1 -dichloro-2,2-bis(*p*-chlorophenyl)ethane; [8] LDEQ = Louisiana Department of Environmental Quality; [9] FDA = Food and Drug Administration; † included in sum for cancer only; ‡ Not based on PCB data. Although PCBs were found in 1986, the PCBs were below FDA levels.

The CT ingestion rate (28.8 g/day) is almost identical to the rate used by LOPH (30 g/day). The RME (upper 95% ingestion rate; 116.8 g/day) and USEPA subsistence fisher value (132 g/day) are well above the ingestion rate used by LOPH (30 g/day).

Through the existing fish-consumption advisory for Devil's Swamp, LOPH recommended that ingestion be reduced to two meals per month, which halves the daily ingestion rate from 30 g/day to 15 g/day. The USEPA HHRA did not adjust ingestion rates to reflect the reduction of meals resulting from the advisory.

If the USEPA HHRA calculated cancer and non-cancer risk values are adjusted to reflect both the LOPH ingestion rate and ingestion reduction due to the fish-consumption advisory, the risk values decrease. The cancer risks under the RME scenario are above the risk goal range of 1 in 1,000,000 (1×10^{-6}) to 1 in 10, 000 (1×10^{-4}) at the Distributary Channels, Devil's Lake, and South Swamp (Attachment 1: Site Map). The cancer risks range from 7×10^{-4} to 2×10^{-4}. If the LOPH ingestion rate, which is 12.8 % of the EPA RME rate (15 g/day ÷ 116.8 g/day = 0.128), were applied, the risks would decrease to an acceptable level of 9×10^{-5} to 5×10^{-5}.

The hazard indices (HI) under the RME scenario are also above the acceptable value of 1 (HI = 1) for all five areas. The HI values range from 2.2 to 27.4 for the Devil's Swamp site (North Bayou, Distributary Channels, North Swamp, Devil's Lake and South Swamp; Attachment 1: Site Map). Through adjusting the ingestion rate to reflect the rate used by LOPH (12.8 % of 116.8 g/day) the HI range (HI = 0.28 to HI = 3.5) can be demonstrated to diminish. The Devil's Lake HI remains elevated at 3.5 even when adapted to reflect the LOPH ingestion rate.

Under the CT scenario, acceptable human non-carcinogenic risk is exceeded for fish and crawfish caught in Devil's Lake (HI = 2). This calculation is based on the consumption of 28.8 g/day. The advisory recommends consumption of no more than two meals per month (15 g/day), which would bring the HI very close to the goal of HI = 1.

Subsistence Fisher Scenario

The health-advisory process in Louisiana is designed for sport fishing and does not address the subsistence fisher. The goal of the advisory is to provide health recommendations so that people can eat fish.

Ban or Advisory to Consume No Fish

The authority does not exist for LOPH to issue recreational fishing bans. Because of infectious contamination, bans within other divisions of LOPH are put on oyster beds harvested for commercial distribution. The most powerful means by which LOPH can restrict fish consumption is to issue advisories that recommend no fish consumption. A ban requires involvement and cooperation among several state agencies, LDEQ, Louisiana Department of Wildlife and Fisheries (LDWF), and LOPH. The Memorandum of Understanding between the agencies makes the following statement regarding a ban [5].

> "A ban is issued when a prohibition on sport or commercial harvest, or sale of fish and/or shellfish is necessary. In order for the ban to be enforced, the Louisiana Wildlife and Fish Commission would issue a rule for Louisiana Department of Wildlife and Fisheries to begin enforcement action. The ban is the most restrictive category and is reserved for areas with high contamination levels and/or extremely toxic chemicals where there is commercial or recreational fishing ".

Children's Health Initiative

The unique susceptibility of children to environmental contaminants is addressed by both the USEPA Risk Assessment and the LOPH fish-consumption advisory. Pregnant women, fetuses, nursing infants, and children may be exposed to PCBs, mercury, and other bioaccumulative compounds through fish ingestion. Some studies have identified neurobehavioral and developmental deficits in newborns exposed in utero to PCBs and mercury. The conservative assumptions used in data evaluation reflect that children's health issues were addressed.

Conclusions

The current LOPH fish-consumption advisory protects the health of recreational fishers. However, a needs assessment (modified Creel Survey) should be conducted to determine precisely who consumes fish and shellfish, where they are caught within the Devil's Swamp area, what species are consumed, how much is consumed, and how they are cooked/prepared (e.g., skin-on versus skin-off). This site-specific information could be gathered through a modified Creel Survey in which persons who are observed fishing and shell fishing are interviewed about their catches. This information will be used to target a health education program for subsistence fishers and fisherman selling to local fish markets in the Devil's Swamp Area.

The USEPA HHRA provides valuable information on distinct areas within Devil's Swamp and Bayou Baton Rouge that are contaminated. LOPH concurs with the predominant contaminants of concern, HCB, HCBD, and PCBs, and the area of investigation covered in the USEPA HHRA.

The differences between the current LOPH fish consumption advisory and the conclusions made in the USEPA HHRA are the result of differences in exposure assumptions and data evaluation. LOPH used data collected earlier than the data EPA used. LOPH uses the average contaminant concentration but USEPA uses both the average and the upper 95% confidence interval. USEPA included a worst case scenario of a subsistence fisher but LOPH evaluated the risk only to recreational fishers. LOPH used different exposure assumptions from the USEPA method.

Recommendations

- LOPH's fish-consumption advisory will remain in place.
- LOPH will conduct a needs assessment (Creel Survey) to gather information about the type of fish and shellfish caught, the amount of fish and crayfish consumed, and how they are prepared by local residents in the Devil's Swamp area. This needs assessment will determine the appropriate health education follow up activities for this community.
- LOPH request the opportunity to evaluate USEPA 1997 fish and crawfish data [1].

References

1. US Environmental Protection Agency, Human Health Risk Assessment Devil's Swamp Baton Rouge, Louisiana. Volume 1, Risk Assessment and Appendices. Dallas, Texas: USEPA Region VI. 1999.

2. US Environmental Protection Agency. Devil's Swamp Site Description. Dallas, Texas: USEPA Region VI. May 4, 1999.

3. Agency for Toxic Substances and Disease Registry, Public Health Assessment for Petro-Processors of Louisiana, Incorporated, Baton Rouge, East Baton Rouge Parish, Louisiana. Atlanta: U.S. Department of Health and Human Services. January 1996.

4. Agency for Toxic Substances and Disease Registry. Site Review and Update, Petro-Processors of Louisiana Baton Rouge, East Baton Rouge County, Louisiana. Atlanta: U.S Department of Health and Human Services. September 30, 1998.

5. Louisiana Department of Health and Hospitals. Protocol for issuing health advisories and bans based on chemical contamination of fish/shellfish in Louisiana. New Orleans: Office of Public Health, Louisiana Department of Environmental Quality, Louisiana Department of Wildlife and Fisheries. January 1997.

6. Ratard R C, Baumgartner E T, Trachtman L. How to interpret fish-consumption advisories. Journal of the Louisiana State Medical Society. Vol 145(6): 263, June 1993.

Preparers of Health Consultation

Margaret Metcalf
Louisiana Office of Public Health

ATSDR Regional Representative

George Pettigrew
Region 6

ATSDR Technical Project Officer

Tammie McRae
Division of Health Assessment and Consultation
Agency for Toxic Substances and Disease Registry

Certification

This Devil's Swamp Health Consultation was prepared by the Louisiana Office of Public Health under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures existing at the time the health consultation was begun.

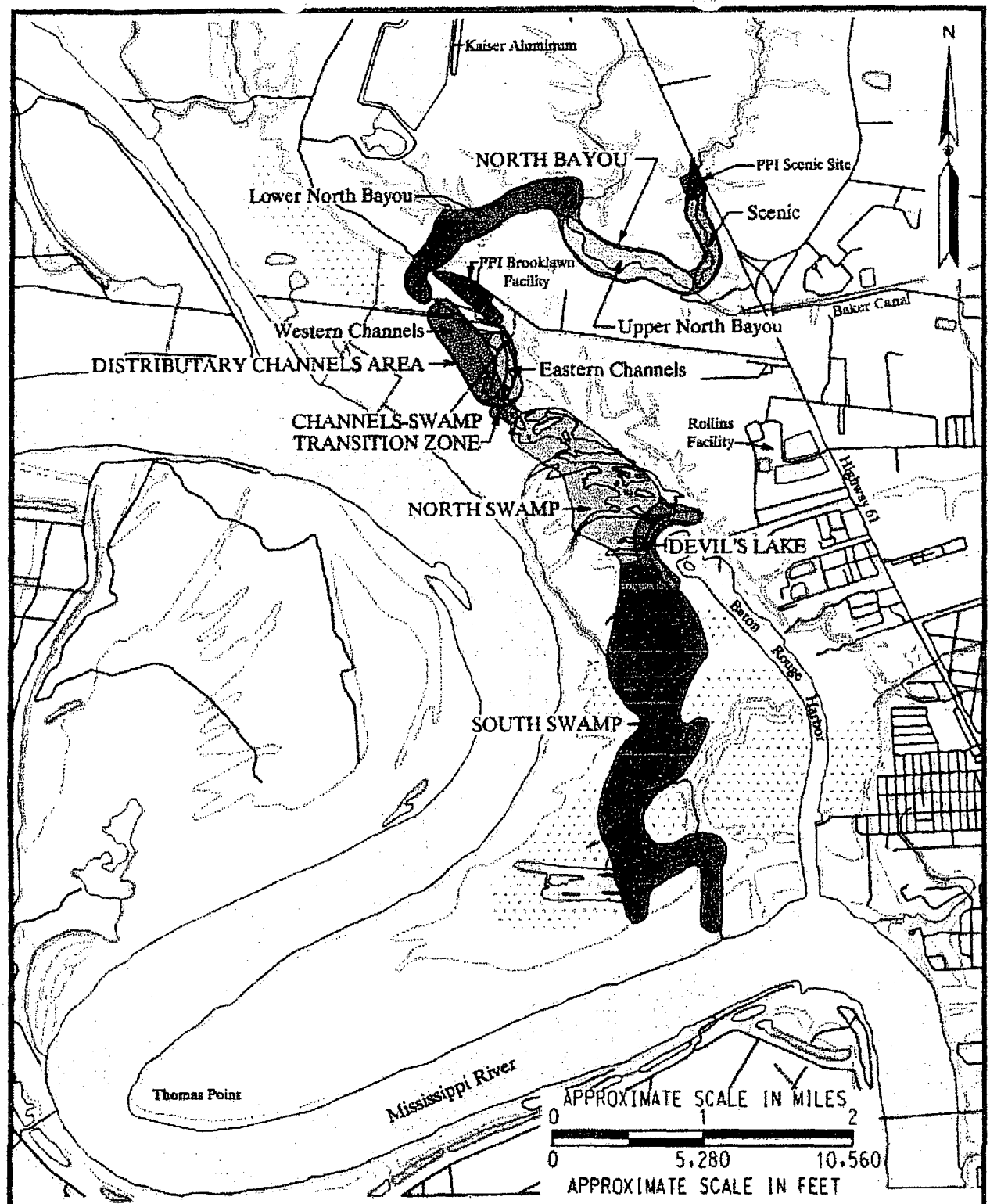
Tammie McRae, MS
Technical Project Officer, SPS, SSAB, DHAC

The Division of Health Assessment and Consultation, ATSDR, has reviewed this public health consultation and concurs with the findings.

Richard Gillig
Chief, State Program Section, DHAC, ATSDR

Attachment 1

Site Map



Devil's Swamp Area of Investigation.

Attachment 2

Louisiana Department of Environmental Quality's Press Release (1987) for Devil's Swamp Lake

DEPARTMENT OF ENVIR IENTAL QUALITY
P. O. Box 44066, Baton Rouge, LA 70804

MARTHA A. MADDEN
Secretary

DATE: OCTOBER 29, 1987

FOR IMMEDIATE RELEASE

DEQ POSTS DEVIL'S SWAMP LAKE

FOR MORE INFORMATION CONTACT MIKE SCHURTZ (504) 342-636

The Department of Environmental Quality has posted Devil's Swamp Lake in East Baton Rouge Parish at the request of Sandra Robinson, M.D., M.P.H., Secretary of the Department of Health and Human Resources and State Health Officer. Based on an assessment of contamination of the lake, DEQ and DHHR advise the public not to swim in the lake or eat fish taken from the lake. Fish samples taken from the lake were analyzed and found to contain hexachlorobenzene (HCB) and hexachloro-1,3-butadiene (HCBD) that exceeded guidelines recently established by the DHHR and the DEQ. Sediment samples contained low levels of polychloronated biphenyls (PCBs). PCBs were also detected in fish samples but at levels that are not considered a threat to health since they do not exceed the U.S. Food and Drug Administration "Action Level."

Sediments from Devil's Swamp Lake and tributary sloughs and bayous indicate the source of contamination is Petro Processors, an abandoned hazardous waste site located on the northern end of Devil's Swamp. This site is under a cleanup plan established under a settlement agreement between the U.S. Environmental Protection Agency, the state of Louisiana and several of the industries identified as having disposed of waste at the site.

The northern portion of Devil's Swamp was posted in late 1986 by DEQ and DHHR advising the public of contamination associated with the Petro Processors site.

Attachment 3

Louisiana Department of Health and Hospitals'
Fish Consumption Advisory for Devil's Swamp 1993

LOUISIANA
Department of HEALTH and HOSPITALS
J. Christopher Pilley
SECRETARY

Louisiana Department of Environmental Quality

DEPARTMENT OF HEALTH AND HOSPITALS
DEPARTMENT OF ENVIRONMENTAL QUALITY

HEALTH ADVISORY FOR THE DEVIL'S SWAMP AND BAYOU BATON ROUGE AREA

July 9, 1993

The Louisiana Department of Health and Hospitals and the Louisiana Department of Environmental Quality are issuing the following health advisory for the Devil's Swamp and Bayou Baton Rouge areas of East Baton Rouge Parish. The area of concern is bounded on the north by Hall Buck Marine Road, on the east by the bluffs and the Baton Rouge Barge Harbor and on the south and west by the Mississippi River.

This advisory modifies a previous advisory in response to recent sampling and analysis of environmental data.

Water and sediment sampling and analyses south of the Petro Processors Superfund site indicate arsenic, lead, mercury, hexachlorobenzene (HCB) and hexachlorobutadiene (HCBD) contamination is present at levels that pose risks to public health. Therefore, the public is advised not to swim nor participate in other primary water contact sports in the area of concern.

Additionally, elevated levels of HCB, HCBD, and mercury have been found in some samples of fish from this area. Because of the levels of contamination, the agencies are advising that consumption of all fish species from these waters be limited to two (2) meals per month. A meal is considered to be one-half (1/2) pound of fish. Recommendations made in this advisory have taken into account individuals with special sensitivities such as children and pregnant women.

This advisory is based on samples taken from both Devil's Swamp and Bayou Baton Rouge. However, the area of concern extends beyond the sampled area. When additional data become available, the boundaries of the advisory will be adjusted, if necessary, to reflect the results of the new information.

High consumption of food contaminated with these chemical residues over a long period of time may increase the risk of cancer or other diseases. The chemicals are usually more concentrated in the fat and skin.

To reduce the risk of exposure to these chemical contaminants, you should trim the fat and skin from fish prior to cooking; bake, broil or grill, and then drain the fat; vary your diet by eating a variety of fish, seafood, meat and poultry from different sources.

For more information regarding this advisory, contact Emelise Cormier, DEQ-Water Resources at 504-765-0634, Tom Stafford, DEQ-Inactive and Abandoned Sites at 504-765-0487, or Jennifer Goodwin, DHH-Office of Public Health, 504-568-8537.

Larry Hebert, M.D.
Assistant Secretary and State Health Officer - Dept. of Health and Hospitals

Dale Givens
Assistant Secretary - Dept. of Environmental Quality